

CLAIMS

What is claimed is:

1. An adjustable low voltage digital to analog converter comprises:

5 digital to analog converter module operably coupled to convert a digital signal into an analog signal based on a reference voltage; and

variable bandgap module operably coupled to produce the reference voltage, wherein the variable bandgap module includes:

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fixed bandgap reference source to produce a fixed reference voltage; and

supply voltage dependent voltage adjust module operably coupled to adjust the fixed reference voltage to produce the reference voltage.

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2. The adjustable low voltage digital to analog converter of claim 1, wherein the supply voltage dependent voltage adjust module further comprises:

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supply voltage sensing module operably coupled to sense a supply voltage and to generate an adjust setting based on the sensed supply voltage; and

adjustable voltage follower module operably coupled to produce the reference voltage from the fixed reference voltage based on the adjust setting.

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3. The adjustable low voltage digital to analog converter of claim 2, wherein the adjustable voltage follower module further comprises:

an operational amplifier having a unity gain compensation network; and

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a variable resistance coupled to an output of the operational amplifier, wherein the variable resistance is set based on the divider setting.

4. A variable bandgap module comprises:

fixed bandgap reference source to produce a fixed reference voltage; and

5. supply voltage dependent voltage adjust module operably coupled to adjust the fixed reference voltage to produce a reference voltage.

5. The variable bandgap module of claim 4, wherein the supply voltage dependent voltage adjust module further comprises:

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supply voltage sensing module operably coupled to sense a supply voltage and to generate an adjust setting based on the sensed supply voltage; and

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adjustable voltage follower module operably coupled to produce the reference voltage from the fixed reference voltage based on the adjust setting.

6. The variable bandgap module of claim 5, wherein the adjustable voltage follower module further comprises:

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an operational amplifier having a unity gain compensation network; and

a variable resistance coupled to an output of the operational amplifier, wherein the variable resistance is set based on the adjust setting.

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7. The variable bandgap module of claim 5, wherein the adjustable voltage follower module further comprises:

an operational amplifier having an adjustable gain compensation network, wherein an output of the operational amplifier produces a voltage greater than the fixed reference voltage; and

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a variable resistance coupled to the output of the operational amplifier, wherein the variable resistance is set based on the adjust setting.

8. An integrated circuit for use in a handheld multiple function device, the integrated circuit comprises:

processing module;

read only memory (ROM);

random access memory (RAM);

memory manager;

digital to analog converter (DAC), wherein the DAC includes:

digital to analog converter module operably coupled to convert a digital signal into an analog signal based on a reference voltage; and

variable bandgap module operably coupled to produce the reference voltage, wherein the variable bandgap module includes:

fixed bandgap reference source to produce a fixed reference voltage; and

supply voltage dependent voltage adjust module operably coupled to divide the fixed reference voltage to produce the reference voltage;

analog to digital converter (ADC); and

bus operably coupled to the processing module, the ROM, the RAM, the memory manager, the digital to analog converter, and the analog to digital converter, wherein the RAM includes an ADC first-in-first-out (FIFO) section and a DAC FIFO section, and wherein the memory manager manages access to the RAM among the processing module, the digital to analog converter and the analog to digital converter.

9. The integrated circuit of claim 8, wherein the supply voltage dependent voltage adjust module further comprises:

5 supply voltage sensing module operably coupled to sense a supply voltage and to generate an adjust setting based on the sensed supply voltage; and

adjustable voltage follower module operably coupled to produce the reference voltage from the fixed reference voltage based on the adjust setting.

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10. The integrated circuit of claim 9, wherein the adjustable voltage follower module further comprises:

an operational amplifier having a unity gain compensation network; and

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a variable resistance coupled to an output of the operational amplifier, wherein the variable resistance is set based on the adjust setting.

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11. The variable bandgap module of claim 9, wherein the adjustable voltage follower module further comprises:

an operational amplifier having an adjustable gain compensation network, wherein an output of the operational amplifier produces a voltage greater than the fixed reference voltage; and

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a variable resistance coupled to the output of the operational amplifier, wherein the variable resistance is set based on the adjust setting.